

Department of Economics
Yale University

Applied Econometrics

Joseph G. Altonji

Fall 2004
Economics 164A

Lectures:

Monday, Wednesday 9:00-10:15

Review Session: TBA

Prof. Altonji's Office Hours:

Monday, 1:15-2:15, 5:00-6:00, Wednesday 10:30-11:55, 27 Hillhouse Ave Room 26

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Course Overview

The subject of this course is how to do econometrics and how to evaluate the econometric research of others. We will consider the selection and use of data to study a question, the design of an econometric model to fit a particular purpose, and the estimation, testing, and use of an econometric model for description, prediction, and/or hypothesis testing. A significant amount of lecture time will be devoted to formal presentation of several of the most commonly used estimation techniques. Some students will have been exposed to them in previous courses. Others will be seeing them for the first time. However, the heart of the course will be the systematic investigation of applications of econometrics using specific research papers and extended examples from the econometrics literature. The usual approach will be to discuss 1) the economic, political, and policy issues that motivate the application, 2) the econometric techniques and issues related to the application (e.g., data, specification, estimation techniques), and 3) the results of the empirical analysis and what we can learn from them. Over the course of the semester, we will study how to address the most important issues that arise when doing an econometric study. These issues include (1) endogeneity of regressors due to omitted variables, simultaneity, or selection, (2) functional form, (3) choice of control variables, (4) measurement error in regressors and handling of outliers, (5) efficient estimation in the presence of heteroskedasticity and serial correlation, (6) appropriate estimation of standard errors and test statistics, and (7) presentation of results. We will consider a number of types of data, including cross section data, time series data, and panel data. We will also go through the steps of obtaining and coding data for use in an analysis. Students will become reasonably proficient in the use of STATA, the leading computer program for statistical analysis in the social sciences.

Prerequisites:

1. Math requirement for the economics major. 2. Economics 161 or Economics 163 or Statistics 238, or equivalent.

Reading:Required Text:

Wooldridge, Jeffrey M., Introductory Econometrics: A Modern Approach, South-Western College Publishing, 2nd edition 2002, available at the Yale Bookstore. If you already own the first (2000) addition of this book, that will be adequate. If you don't, buy the 2nd edition rather than a used copy of the old.

I have also ordered Lawrence C. Hamilton, Statistics with Stata Updated for Version 8, Thomson as a supplemental text. It is not required. However, it highlights some of the most commonly used commands in STATA and is worth buying and reading, particularly if you are writing a senior essay.

We will also be working extensively with journal articles and unpublished research papers. In a couple of cases the materials are reserve at Cross Campus Library. These are denoted "CCL" below. In most cases you can access the material over the internet at the locations listed below, typically JSTOR.

In some cases I will make my lecture notes available on the class web page on the "classes" server. **As I note below, I expect you to come to class, whether my notes are available or not.**

STATA:

The computer program STATA will be used extensively in the course. It is readily available on the computers in STATLAB, but some students elect to purchase it anyway for the convenience. The current version is Version 8.0, but versions 6 or later will be okay. You can purchase STATA by following the instructions at <http://statlab.stat.yale.edu/help/doco/statabuy.jsp>. There it says:

To purchase Stata and Stat/Transfer: Contact STATA directly by fax, phone, email, or regular mail. The web address is <http://www.stata.com/info/order/new/edu/gradplans/gp3-order.html>. Tell them your affiliation with Yale, place your order and give them your charging information. The software and manuals are then picked up at the **Social Science Statistical Laboratory (StatLab)** at 140 Prospect Street, room 100.

Choose Intercooled STATA, **not** SMALL STATA. SMALL STATA is not adequate for many of the applications we will consider.

On the class server I have place links to a couple of guides to STATA. STATA contains an extensive on-line help facility. One reasonably good introduction is

<http://www.biostat.au.dk/teaching/software/STATA/Stata8.pdf>

Documentation for STATA is available in the STATLAB.

Requirements:

1. Class attendance and participation, 5%. **You are required to come to class.**
2. 5 of 6 problem sets (30%),
3. A project/term paper that will involve replication or extension of an existing study (25%),
4. A take home midterm that will draw on the assigned readings and my lecture notes and will not involve computing, (10%), and
5. A take-home final exam that will involve econometric analyses of problems using data supplied for that purpose (30%).

Grades on the problem sets will be based on your best 5, so you can miss one no questions asked. If you do all 6, then I will drop your lowest score. I don't accept late problem sets.

Key Dates:

Problem Sets will go out about every other week, and you will have a week or a bit more to do them.

The Take home Midterm will go out on Wednesday, Oct 15th and be due the following Wednesday.

Project: Due December 9, 4:30PM. (I will give extensions into exam week in special circumstances.)

Take Home Final: To provide you with flexibility while preventing you from spending half of your youth on the take home final, you will have 48 hours to do the final from the time that you pick it up. You will be able to pickup the final from Kathy Toensmeier (in the office on the same floor as mine) beginning on Friday of reading period (Dec. 10th) at 4:30. If you pick up the exam on Friday the 10th, it is due on Monday the 13th at 9:00. Exams must be in by Saturday, 9:00 AM of exam week (December 20th)

Outline for the Course (Subject to Change)

We almost certainly will not get through all of the topics and applications that I have listed. Furthermore, I will add a few more papers during the course and will probably drop a couple that are currently listed. I will use email and in class announcements to keep you informed about what items to read for the next class or two.

Part A : Simple and Multiple Regression (Week 1 to Week 4)

A.1 Review of the Multiple Regression Model

Methods

Wooldridge, Ch 2-5, Wooldridge ch 7.1 – 7.4 (Dummy Variables)

Alternatively, you may prefer to review the corresponding chapters from the text book you used in your previous course in econometrics and your lecture notes. The best way to proceed in the first week is to pretend you are studying for the final exam in your basic econometrics course.

Applications:

The Intergenerational Correlation in Height

Sources of Economic Growth:

Daron Acemoglu, Simon Johnson and James Robinson, “The Colonial Origins of Comparative Development: An Empirical Investigation, *American Economic Review*, vol 91 (December 2001): 1369-1401

http://econ-www.mit.edu/faculty/acemoglu/files/papers/origins_aerfinal.pdf

Class Attendance and Student Learning:

[Garey C. Durden and Larry V. Ellis, “The Effects of Attendance on Student Learning in Principles of Economics”, *American Economic Review*, vol 85 No. 2 May 1995, pp. 343-346. \(JSTOR\)](#)

url: [http://links.jstor.org/sici?sici=0002-](http://links.jstor.org/sici?sici=0002-8282%28199505%2985%3A2%3C343%3ATEOAOS%3E2.0.CO%3B2-T)

[8282%28199505%2985%3A2%3C343%3ATEOAOS%3E2.0.CO%3B2-T](http://links.jstor.org/sici?sici=0002-8282%28199505%2985%3A2%3C343%3ATEOAOS%3E2.0.CO%3B2-T)

A.2 Using Economic Theory to Motivate a Regression Study

Applications:

The Capital Asset Pricing Model and Event Studies – Is there money to be made in the stock market? Information flows and the value of capital.

Ernst R. Berndt, *The Practice of Econometrics*, Addison Wesley, 1991, Chapter 2: “The Capital Asset Pricing Model: An Application of Bivariate Regression Analysis” (CCL)

A.3: Using Regression Models to Decompose Group Differences

Applications: The Earnings Gap Between Men and Women
The Black/White Wealth Gap

J. Altonji, U. Doraszelski and L. Segal, "Black/White Differences in Wealth" Economic Perspectives Federal Reserve Bank of Chicago, Winter 2000

<http://www.chicagofed.org/publications/economicperspectives/2000/Epart3.pdf>

(An updated, more complete, and somewhat more technical version of this paper is available on the Yale Economics Growth Center web page as Discussion Paper No. 865. <http://www.econ.yale.edu/~egcenter/EGCdiscussion3.htm>)

A.4 Some Practical Issues:

1. Sensitivity of results to particular observations (Economic Growth)
2. Treatment of outlier values of the dependent variable and the explanatory variables (wealth). Quantile Regression.
3. Accounting for nonlinear effects: Functional Form for the dependent variable (application to wealth) and the independent variable
4. Omitted Variables (Economic Growth)
5. Estimating Standard Errors in the presence of heteroskedasticity (Huber-White standard errors)
6. Weighting of observations
7. Estimated Regressors. (Application to measuring the permanent component of earnings and to the formation of indices of occupational characteristics)
8. Imputing missing data.
9. Reporting Regression Results. (What should be in a regression table?)

A.5 Developing and Using a Regression Model to Make Predictions

Wooldridge, 6.4

1. Orley Ashenfelter, David Ashmore, and Robert Lalonde, "Bordeaux Wine Vintage Quality and the Weather", *Chance*, 1995

<http://www.liquidasset.com/orley.htm>

2. Predicting the Outcomes of Presidential Elections

Ray Fair, Predicting Presidential Elections and Other Things Stanford University Press, Chapters 1, 3, and 4. (On reserve at CCL)

Part B: Study Designs to Distinguish Correlation From Causality (Weeks 5-8)

B.1 Omitted Variables: Sources of Variation, Difference Estimators, Difference in Difference Estimators, Regression Discontinuity Designs

Wooldridge, Chapter 13, especially 13.2-13.5 and Appendix 13A

Applications:

The Effect of the Minimum Wage

[Card, David and Alan B. Krueger \(1994\), "Minimum Wages and Employment: A Case Study of the Fast Food Industry." American Economic Review 84\(4\), \(1994\): 772-793. JSTOR](#)

url: <http://links.jstor.org/sici?sici=0002-8282%28199409%2984%3A4%3C772%3AMWAEAC%3E2.0.CO%3B2-O>

Effect of a Garbage Incinerator's Location on Housing Prices

Worker Compensation and Injury Duration

[Bruce D. Meyer, V. Kip Viscusi, and David L. Durbin, "Worker Compensation and](#)

[Injury Duration: Evidence from a Natural Experiment” American Economic Review 85\(3\), \(June 1995\): 322-340. \(JSTOR\)](#)

url: [http://links.jstor.org/sici?sici=0002-](http://links.jstor.org/sici?sici=0002-8282%28199506%2985%3A3%3C322%3AWCAIDE%3E2.0.CO%3B2-4)

[8282%28199506%2985%3A3%3C322%3AWCAIDE%3E2.0.CO%3B2-4](http://links.jstor.org/sici?sici=0002-8282%28199506%2985%3A3%3C322%3AWCAIDE%3E2.0.CO%3B2-4)

Effect of Low Versus Medium Security Prison on Recidivism

*Chen_Shapiro_prison092302.pdf on class server (I may decide to delay coverage of this paper until the section on Instrumental Variables)

Steven Levitt and John Donohue, "The Impact of Legalized Abortion on Crime." *Quarterly Journal of Economics*, v116, n2 (May 2001): 379-420.

B.2 Omitted Variables Bias: Panel Data and Error Components Models

Wooldridge, Chapter 14.

1. The Effects of teenage pregnancy on socioeconomic outcomes

[*Geronimus, A. and S. Korenman \(1992\), “The Socioeconomic Consequences of Teen Childbearing Reconsidered,” *Quarterly Journal of Economics*, 107, 1187-1214.](#)

url: [http://links.jstor.org/sici?sici=0033-](http://links.jstor.org/sici?sici=0033-5533%28199211%29107%3A4%3C1187%3ATSCOTC%3E2.0.CO%3B2-8)

[5533%28199211%29107%3A4%3C1187%3ATSCOTC%3E2.0.CO%3B2-8](http://links.jstor.org/sici?sici=0033-5533%28199211%29107%3A4%3C1187%3ATSCOTC%3E2.0.CO%3B2-8)

(JSTOR)

2. The Effects of Marriage on Wage Rates

[*Korenman, Sanders D. and David Neumark, 1991, “Does Marriage Really Make Men More Productive?” *Journal of Human Resources*, pp. 282-307.](#)

JSTOR

url: [http://links.jstor.org/sici?sici=0022-](http://links.jstor.org/sici?sici=0022-166X%28199121%2926%3A2%3C282%3ADMRMMM%3E2.0.CO%3B2-L)

[166X%28199121%2926%3A2%3C282%3ADMRMMM%3E2.0.CO%3B2-L](http://links.jstor.org/sici?sici=0022-166X%28199121%2926%3A2%3C282%3ADMRMMM%3E2.0.CO%3B2-L)

3. The Effects of Union Membership on Wage Rates

4. The Effects of School Quality on Educational Attainment and Wages

[*Altonji, Joseph G. and Thomas Dunn, "Using Siblings to Estimate the Effects of School Quality on Wages" *Review of Economics and Statistics*. \(November 1996\): 665-671.](#)

JSTOR

url: [http://links.jstor.org/sici?sici=0034-](http://links.jstor.org/sici?sici=0034-6535%28199611%2978%3A4%3C665%3AUSTETE%3E2.0.CO%3B2)

[6535%28199611%2978%3A4%3C665%3AUSTETE%3E2.0.CO%3B2](http://links.jstor.org/sici?sici=0034-6535%28199611%2978%3A4%3C665%3AUSTETE%3E2.0.CO%3B2)

B.3: Instrumental Variables/2 Stage Least Squares

Wooldridge, Chapter 15

Handout on Measurement Error

Applications:

1. The return to job seniority

2. The effects of teenage pregnancy on socioeconomic outcomes
V. Joseph Hotz, S. McElroy and S. Sanders, "The Costs and Consequences of Teenage Childbearing for the Mothers and the Government," in *Kids having Kids: The Economic Costs and Social Consequences of Teen Pregnancy*, ed. by R. Maynard, Urban Institute Press, 1997, pp. 55-94. (Available on course web page).
3. The effects of military service on future labor market success
4. The effect of Catholic school attendance on high school graduation
J. Altonji, T. Elder, and C. Taber, "An Evaluation of Instrumental Variable Strategies for Estimating the Effects of Catholic Schooling", NBER Working Paper No. 9385
<<http://papers.nber.org/papers/W9358>>
5. Measurement error in an explanatory variable: Labor Supply and Wages, consumption and income.
6. M. McClellan, B.J. McNeil and J.P. Newhouse, "Does more intensive treatment of acute myocardial infarction reduce mortality?", *Journal of the American Medical Association* 272(11): 859-66, September 1994. CCL
7. Orley Ashenfelter and Michael Greenstone, "Using Mandated Speed Limits to Measure the Value of a Statistical Life", NBER Working Paper, February 2002. (You can access this paper from www.nber.org).

Part C. Categorical Dependent Variables (Week 9)

C.1 Binomial Discrete Choice Models: Linear Probability, Logit and Probit Models.

Wooldridge, ch. 7.5, ch 17.1.

Applications:

[Alicia H. Munnell, Geoffrey M.B. Tootell, Lynne E. Browne and James McEneaney, "Mortgage Lending in Boston: Interpreting HMDA Data" *American Economic Review* 1996, pp. 25-53. JSTOR](http://links.jstor.org/sici?sici=0002-8282%28199603%2986%3A1%3C25%3AMLIBIH%3E2.0.CO%3B2-0)

url: <http://links.jstor.org/sici?sici=0002-8282%28199603%2986%3A1%3C25%3AMLIBIH%3E2.0.CO%3B2-0>

Effects of Catholic School Attendance on the High School Dropout Rate

C.2 Ordered discrete outcomes, subjective variables, scaled variables.

Applications:

1. How satisfied are you?: Satisfaction with family, work, life, etc.
2. When do civil war settlements hold? (tentative)

D. Censored Data Models: Application to Durations. (Week 10)

Wooldridge, ch 17.2, 17.4.

Applications:
How long will a marriage last?
Duration of Recidivism
How Long Do Transplanted Kidneys last?

E. Selection Bias.

(Week 11)

Wooldridge, ch 17.5.

Applications:
To Be Announce

F. Time Series and Forecasting

(Week 12 and 13)

Wooldridge, Chapter 10.1, 10.2, 11 and 12.

Applications (tentative)

2. Orange Juice Prices and Cold Weather.
3. Forecasting Inflation

One or two classes during the last 2 weeks will be devoted to student presentations of class projects, assuming that I can get some volunteers.